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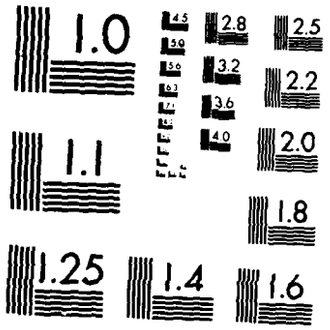

AFOSR-TR- 86-2092

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FINAL TECHNICAL REPORT

ACQUISITION OF AN ANALYTICAL ELECTRON MICROSCOPY FACILITY

CONTRACT #AFOSR-85-0040

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SECURITY CLASSIFICATION OF THIS PAGE

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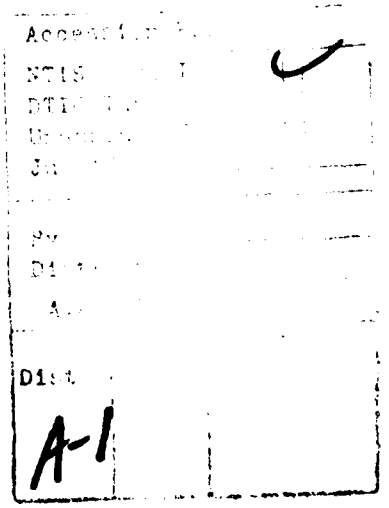
This AFOSR grant was utilized to purchase an analytical electron microscope facility and associated X-Ray analyzer (with matching funds from Rensselaer Polytechnic Institute. The instrumentation has been delivered and is currently being certified to insure that all specifications are met. A list of equipment and associated auxiliary apparatus is appended.



Equipment

Group I

JSM-840 II SCANNING ELECTRON MICROSCOPE

Resolution:	4nm (40/ Guaranteed
Accelerating Voltage:	0.2kV to 1kV in .2kV steps, 1kV to 40kV in 1kV steps
Magnification:	10x to 300,000x (144 steps) 100x Instant Low Mag

Consisting of the following:

A. Electron Gun Assembly with pre-centered tungsten filament and variable bias control

B. Electron Optical System and associated power supply

C. Three Stage Lens System consisting of 2-stage zoom condenser lens and water cooled corrected field objective lens

D. Two Step Anode Height Adjustment allowing optimum brightness throughout accelerating voltage range

E. Microporocessor Control of electron optics system including
- Automatic compensation of gun brightness
- Constant probe current compensation
- Probe current indication
- Automatic image brightness compensation
- Indication of optimum OL aperture

F. Eucentric Large Goniometer Specimen Stage with Specimen Exchange Airlock

X-movement:	50mm
Y-movement:	70mm
Z-movement:	40mm (fine adjustment +2 to -3mm)
W.D.:	8, 15, 25, 39 and 48m
Tilt:	-5 to +90 degrees
Rotation:	360° endless

G. Gun isolation valve

H. Column linear tube allowing all coils and lenses to be located outside of the vacuum

I. Externally selectable, X-Y adjustable, multiple (4) aperture system for objective lens

J. Scanning System with full frame scanning, reduced frame scanning, selected area scanning, bright up line scanning, line profile, spot mode, Y-modulation, and T.V. scanning.

K. Image Selector Switch (IMS) for selecting image mode and image mixing

Group I (continued)

L. 12" High-Resolution Long Persistence Viewing CRT with real time imaging

M. Ultra High Resolution Recording CRT (2000 lines)

N. 11 Span Attachment Rack

O. Camera (CS1-3) and Polaroid model 545 4 x 5 film holder

P. Automatic Data Recording Device including accelerating voltage, magnification, micron marker, micron value, working distance and film number. (In Electron Channeling Pattern Mode the micron marker and micron value are replaced by rocking angle bar and value)

Q. Console LED Display of film number, magnification, aperture number, probe current, working distance, and accelerating voltage

R. High Sensitivity Solid State Annular Backscattered Electron Detector (10nm Resolution) allowing both composition and topography images

S. Gamma Control - Differential Amplifier

T. Multiple Image Display (MDD) on Viewing CRT (2 channel)

U. Built-in Waveform Monitor

V. Fully Automatic Vacuum System consisting of two diffusion pumps connected in series (each with a water cooling baffle), a reservoir tank and a mechanical rotary pump

W. Installation and proof of resolution quarantee in customer laboratory, one year all parts and labor warranty and one set of operators manuals

1 G.W. Type 31 Specimen Current Amplifier

1 PCD-40, Probe Current Detector

1 LND-40, Liquid Nitrogen Dewar

1 FKB-40, Full Alphanumeric Keyboard

1 SRT-40, Scan Rotation and Tilt Correction Device

1 LBG-2, Lanthanum Hexaboride Gun Modification (including Vacuum Gauge)

1 RO33SP/W, (Water Cooled) Haskris Water Recirculator (115V)

1 Spare Tungsten Wehnalt Assembly

1 DZM-40, Dual and Zoom Mag Unit

Group I (continued)

1 TN-5500/BBEA, X-Ray Analyzer with 100 HMz ADC, one Floppy Disk Drive, Color Monitor, Control Console, Amplifier, Bias, Ratemeter, System Cabinet and 1 MByte LSI 11/73 CPU Plus 1 removeable Winchester 10 MByte Disk Drive with two 10 MByte Cartridges

1 TN-5520-30, Camera, Handheld 3" x 4" Polaroid Camera Assembly with Mating Hood

1 TN-5520-31, Camera, Handheld 35mm Instant Slide Camera Assembly with Mating Hood

1 TN-5525-606, Micro-Scan Controller Digital Scan Interface with Relay Board, and MSCAN Software and Cables (2 TN Slots) for JEOL 840

1 TX-3/54-6620, $30mm^2$, 154 eV Resolution Si(Li) Detector for JSM-840

1 TN-5550-10, Packaged Software, SEM Quantitative Analysis, MATCH/SORT, Micro-Q/Q-File, ZAF B/A

1 TN-5520-51, Plotter, HP 7475A Digital Six Pen Plotter with +HP Program and Cable (90 day warrenty) Requires Serial Line Interface

1 TN-5520-51/W, Warranty period to extend HP 7475A coverage to one year

1 TN-5515-31, Communication, DLVJ1-M Four Channel Asynchronous Serial Line Interface for EIA/CCITT (Required for TN-5600 Column Automation, 1 Double Q-Slot)

1 TN-5520-10, Printer, 120 CPS Printer/Plotter with Parallel Port

1 TN-5635-12, Current Monitor, Stand-Along Beam Current Monitoring Package including Programmable Digital Current Meter with two Current Inputs, Beam Current Correction Software and TN-5600/B

1 TN-5585-13, Installation and Training of EDS System with Micro-Scan Controller and 1 Software School Credit

Group II

1 MRH-40, Mamiya 6 x 7 Roll Film Holder

1 BEIH-40, High Speed Video Amplifier for use with TVS

1 SACP-40, Selected Area Channeling Pattern Device

Equipment

Group III

JEM-100CX ELECTRON MICROSCOPE

Consisting of the following:

A. Electron Gun Assembly with Cool Beam Illumination System

B. Pneumatic Gun Lift

C. Electron Optical System and Console

D. All solid-state compact power supplies

E. New "Dual Zone" specimen anticontamination trap (ACS-II)

F. CRT Type specimen position indicator (SPI)

G. Eucentric Side Entry Goniometer, includes:
   1. SEG1 - basic goniometer mechanism
   2. HM-PP - high mag pole piece. ±30 degree tilt, 2.0A lattice or 4.0 point resolution guaranteed. 100 - 450,000 magnification range
   3. EM-SQH^2 "Quick Change" holder for use with HM-PP. Accepts two 3mm grids
   4. SAP - pole piece ±60 degree tilt, 2.0A lattice or 4.5A point resolution attainable. 100 - 320,000 magnification range

H. High resolution dark field image (±6 degrees in any direction)

I. Zoom stigmator

J. Optimum under focus

K. High Voltage and Image Wobbler Systems

L. 10X Binocular

M. Automatic exposure meter (electron beam measuring type)

N. Automatic sheet film camera

O. Magnification or camera length and film numbering device

P. Film desiccator

Q. Fully automatic vacuum system (10^{-7} Torr) with Pirani Gauge

R. Compressed air supply system

S. Operator's Chair

T. Installation and proof of resolution guarantee in customers laboratory, 16 months all parts and labor warranty and one set of operator's manuals.

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